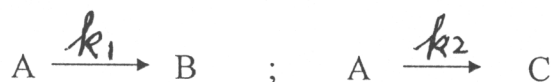


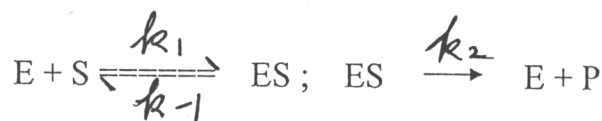
1. (30%) Please describe: (1) chemisorption.
 (2) the Langmuir adsorption isotherm
 (3) van der Waals forces
 (4) the capacity of buffer solution
 (5) p-type semiconductor,
 (6) Nernst equation
2. (10%) $\Delta G = \Delta H - T\Delta S$ is an equation of second thermodynamics.
 Please describe the relationship between this equation and chemical reaction.

3. (20%) Derive the integrated rate equation for a parallel first reaction, and then have equations for [A], [B], [C] in exponential form. (assume that only A is present initially)



4. (20%)
 (1) State the Arrhenius law.
 (2) A second-order reaction in solution has a rate constant (k) of $5.7 \times 10^{-5} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ at 40°C . Calculate the activation energy (E) and the preexponential factor (A), assuming the Arrhenius law to apply. (R is the gas constant, equal to $8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

5. (20%) An enzymatic reaction is represented as



The concentration of enzyme-substrate complex [ES] is assumed to maintain at a constant value throughout the reaction. Please derive an equation to express the reaction rate.